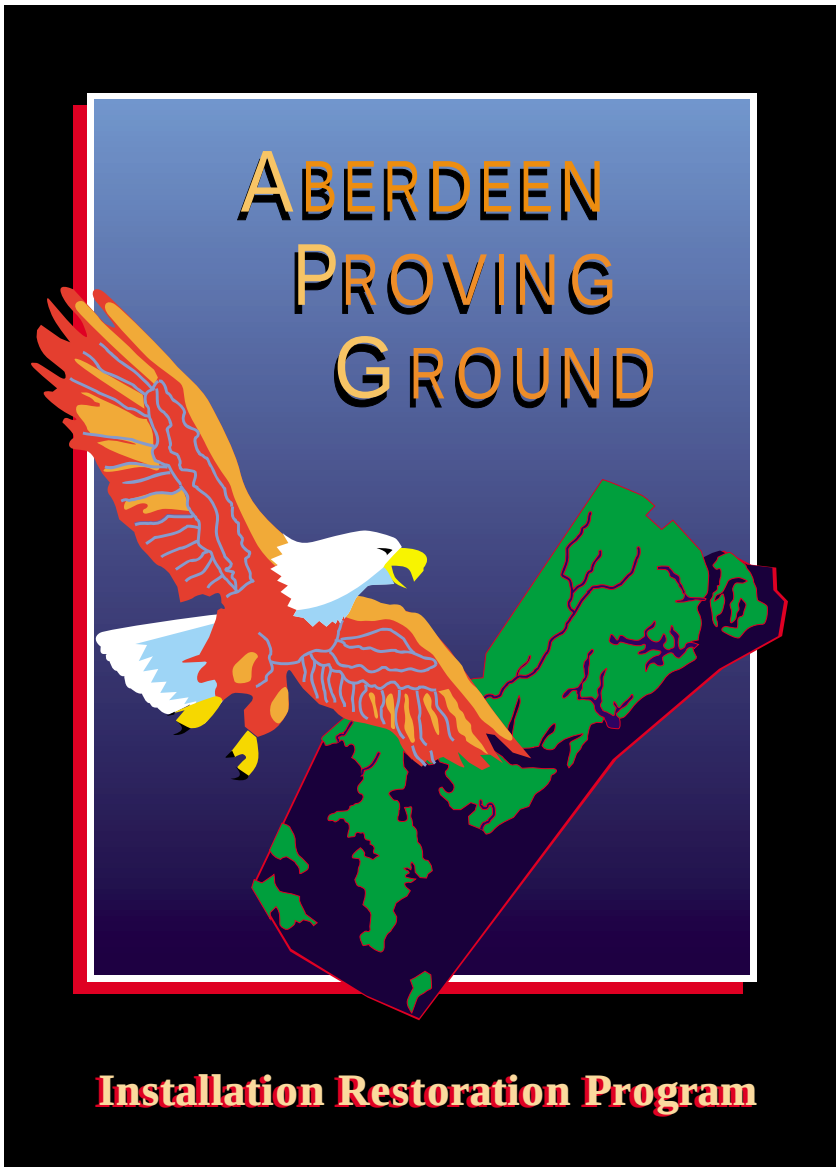

J-Field Study Area Proposed Plan
March 2001

Aberdeen Proving Ground, Maryland

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FINAL REMEDIATION ACTION
J-FIELD STUDY AREA
PROPOSED PLAN

Aberdeen Proving Ground, Maryland

Presented by

Directorate Of Safety, Health And Environment
Environmental Conservation and Restoration Division
Installation Restoration Program
U.S. Army Garrison Aberdeen Proving Ground, Maryland

March 2001

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LIST OF ACRONYMS

1,1,2-TCA	1,1,2-trichloroethane
1,1-DCE	1,1-dichloroethene
1,2-DCA	1,2-dichloroethane
1,2-DCE (total)	1,2-dichloroethene
ACLs	Alternate Concentration Limits
APG	Aberdeen Proving Ground
APG-EA	Aberdeen Proving Ground – Edgewood Area
ARARs	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive, Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COMAR	Code of Maryland Regulations
COPCs	Contaminants of Potential Concern
CWA	Clean Water Act
CWM	chemical warfare material
CZMA	Coastal Zone Management Act
DNAPL	dense nonaqueous phase liquid
DSERTS	Defense Site Environmental Restoration Tracking System
DSHE	Directorate of Safety, Health, and Environment
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Differences
FS	Feasibility Study
GCW	Groundwater Circulation Wells
GIS	Geographical Information System
HE	high explosives
HHRA	Human Health Risk Assessment
HMTA	Hazardous Materials Transportation Act
HRC	Hydrogen Release Compound
IRP	Installation Restoration Program
MCLs	Maximum Concentration Limits
MDE	Maryland Department of Environment
MNA	Monitored Natural Attenuation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NPDES	National Pollutant Discharge Elimination System

NPL	National Priorities List
O&M	Operations and Maintenance
OSHA	Occupational Safety and Health Administration
OU	Operable Unit for Groundwater
PCE	tetrachloroethene
POTWs	Publicly-Owned Treatment Works
PP	Proposed Plan
PSB	Protective Soil Blanket
RAB	Restoration Advisory Board
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SDWA	Safe Drinking Water Act
SECs	Shoreline Erosion Controls
SOU	Soil Operable Unit
TBP	Toxic Burning Pit
TCE	trichloroethene
TI	Technical Impracticability
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
USC	United States Code
USGS	U.S. Geological Survey
UVB	Unterdruck-Verdamfer-Brunnen (Vacuum Vaporizer Well)
UXO	unexploded ordnance
VC	vinyl chloride
VOCs	volatile organic compounds

Glossary of Terms

Abiotic	Process which does not occur by microbial action.
Administrative Record	A file maintained by the lead agency and containing all the information it used to make its decision on the selection of a response action under CERCLA. This file is to be available for public review and a copy established at or near the site, usually at one of the information repositories.
Applicable or Relevant and Appropriate Requirements (ARARs)	Any state or federal statute that pertains to environmental conditions or use of a particular cleanup technology at a Superfund site.
Alternate Concentration Limits (ACLs)	Site-specific cleanup standard used in lieu of an ARAR
Aquifer	An underground rock formation composed of materials such as sand, soil, or gravel that can store and supply groundwater to wells and springs. Most aquifers used in the United States are within a thousand feet of the earth's surface.
Biodegradation	Decomposition of organic chemicals by biological processes, such as the breakdown of wastes by bacteria.
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)	A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). These Acts provide for the investigation and cleanup of abandoned or uncontrolled hazardous waste sites.
Confined Aquifer	An underground formation or formations in which groundwater is found under significantly greater than atmospheric pressure.
Ecological Risk Assessment	The application of a formal model or framework to estimate and interpret the effects of human actions on a natural resource.
Exposure Pathways	The means by which a contaminant can reach a human.
Extraction	Withdrawal of a substance (in the case of groundwater extraction, the water is withdrawn from the aquifer so that it can be treated).
Feasibility Study (FS)	An investigation conducted under CERCLA in which remedial alternatives are identified, screened, and evaluated to develop a recommended cleanup alternative.
Groundwater	Water found beneath the earth's surface, usually in aquifers.
Human Health Risk Assessment	An evaluation of the possible risk posed to human health by the presence of specific contaminants.
Installation Restoration Program	The Department of Defense program to identify and clean up hazardous waste sites at its installations. The IRP process includes preliminary assessment, remedial investigation, feasibility study, remedial design and remedial action.
Institutional Controls	Measures taken to restrict access to an area or to restrict use of an area or a resource and thereby prevent exposure to chemicals. May include physical access controls such as fences and administrative controls such as deed restrictions.

Maximum Concentration Limits (MCLs)	Numerical limit established under the Safe Drinking Water Act for certain drinking water constituents.
National Oil and Hazardous Substances Pollution Contingency Plan (NCP)	The federal regulation promulgated to implement the Superfund program. The NCP was revised in February 1990.
National Priorities List (NPL)	EPA's list of the uncontrolled or abandoned hazardous waste sites that are priorities for long-term remedial evaluation and response.
Natural Attenuation	Physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil or groundwater.
Operable Unit	Separate activity undertaken as part of a Superfund site cleanup.
Permeability	The rate at which liquids pass through soil or other materials in a specified direction.
Phytoremediation	Use of plants to control or reduce contaminant levels in soils or groundwater.
Plume	A measurable discharge of a contaminant from a given point of origin.
Proposed Plan	A document that describes for public comment the preferred cleanup strategy, rationale for the preference, and alternatives presented in the detailed analysis of the remedial investigation / feasibility study.
Receptors	Populations of human beings or other species potentially at risk from contamination.
Record of Decision (ROD)	A public document that explains which cleanup alternative will be used at a National Priorities List site. The ROD is based on information and technical analysis generated during the remedial investigation / feasibility study and consideration of public comments and community concerns.
Remedial Action (RA)	The actual construction or implementation phase that follows the remedial design of the selected cleanup alternative at a site on the National Priorities List.
Remedial Investigation	An in-depth study designed to gather data needed to determine the nature and extent of contamination at a Superfund site, establish site cleanup criteria, identify preliminary alternatives for remedial action, and support technical and cost analyses of alternatives.
Remediation	Cleanup or other methods used to remove or contain hazardous materials from a Superfund site.
Resource Conservation and Recovery Act (RCRA)	Federal regulations governing hazardous management waste from generation to disposal. This statute focuses on the protection of groundwater supplies. Its primary objectives are to protect human health and the environment and to conserve materials and energy resources.
Soil Operable Unit	Delineation of an area containing contaminated soil at a Superfund site.

Treatability Studies	Tests of potential cleanup technologies conducted in a laboratory.
Volatile Organic Compound	An organic (carbon-containing) compound that volatizes (vaporizes) readily at room temperature.

ABERDEEN PROVING GROUND

FINAL REMEDIAL ACTION
J-FIELD STUDY AREA

PROPOSED PLAN

March 2001 Aberdeen Proving Ground, Maryland

1. INTRODUCTION AND PURPOSE

This **Proposed Plan** summarizes the remedial alternatives to address Contaminants of Potential Concern (COPCs) from the J-Field Study Area including the Surficial **Aquifer,** the **Confined Aquifer**, and the **Soil Operable Unit (SOU)** and remaining soil areas at J-Field. The remedial objective for the J-Field Surficial Aquifer is removal of contaminant mass, thereby reducing the toxicity, mobility, and volume of the contaminants.

The Defense Site Environmental Restoration Tracking System (DSERTS) number for the J-Field Surficial Aquifer is EAJF05-B. This Proposed Plan summarizes conditions at the site and compares different methods for addressing the Surficial Aquifer contaminant **plume**. This Proposed Plan also includes the basis for selection of the proposed remedy for the Surficial Aquifer.

The actions identified in this Proposed Plan will constitute the Final **Remedial Action** for the J-Field Study Area. Previous removal and remedial actions have been implemented to address the SOU. Previous activities in the J-Field Study Area are listed in Table 1. This Proposed Plan describes proposed action to be taken to address the Surficial Aquifer. No further action beyond those presented herein and those underway in accordance with prior **Records of Decision (RODs)** is proposed for additional **groundwater** or remaining soil areas in the J-Field Study Area. A listing of these soil areas is given in Table 2. Available data from **Remedial Investigation** activities indicate that these soil areas do not pose risk to human health or the environment. Several limited areas at J-Field remain active for Open Burn / Open Detonation operations under Aberdeen Proving Ground's (APG) **Resource Conservation and Recovery Act (RCRA)** program.

The terms presented in bold-faced type are defined in a glossary, which is presented on page viii of this document.

Table 1
J-Field Study Area:
Previous Activities

Activity	Date
Environmental Contamination Survey	1977 - 78
Munitions Disposal Study	1983
RCRA Facility Investigation	1986
Hydrological Assessment, Phase I	1987 - 92
Characterization and Interim Remediation	1992
Hydrological Assessment, Phase II	1992
Sediment Sampling Study	1992
Piezometer Installation and Sampling	1994
Toxic Pits Pilot Remediation Study	1994
Deep Drilling	1995
Remedial Investigation	1991 - 1996
Ecological Risk Assessment	1994 - 96
Aquatic Toxicity Evaluation	1994 - 97
Well Installation and Sampling	1996
Natural Attenuation Study	1997 - 2000
Phytoremediation Demonstration	1997 - present
Honeybee Biomonitoring Program	1997 - present
Groundwater Level Monitoring Study	1998 - present
Hydrogen Release Compound (HRC) Treatability Study	1998 - 1999
Vacuum Vaporizer Well (UVB) Technology Treatability Study	1998 - 1999
Biosolids Investigation	1999
Borehole Geophysical Investigation	1999
Confined Aquifer Wells Abandonment and Replacement	2000

Table 1
J-Field Study Area:
Previous Activities
(Continued)

Activity	Date
Geochemical Evaluation of Arsenic and Lead Mobility	2000
Time Critical Removal Action	2000
Sampling for Products of Combustion	2000
ROD for Toxic Burning Pits (TBPs)	1996
Shoreline Erosion Controls	September 1998 – April 1999

Table 2
Summary of DSERTS Sites Addressed by J-Field Proposed and Completed Actions

DSERTS Site		Soil OU ROD ESD[a]	J-Field Study Area		Projected ROD Date FY
Name	Number		Action	No Further Action	
J-Field Study Area	EAJF00				2001
White Phosphorus Burning Pit[b]	EAJF01			X	2001
Prototype Building[c]	EAJF02			X	2001
Riot Control Burning Pit	EAJF03			X	2001
Robbins Point Demolition Ground[b]	EAJF04				2001
Toxic Burn Pits[a]	EAJF05	X		X	1996
Toxic Burn Pits – Southern Main Pits Overall	EAJF05-A	X			1996
Surficial Aquifer	EAJF05-B		X		
South Beach Demolition Ground	EAJF06			X	2001
South Beach Trench	EAJF07			X	2001
X1 Ruins Sites, SW of Intersection	EAJF08			X	2001
Drainage Grid (Area A)	EAJF09			X	2001
Ford's Point Firing Position (Area B)	EAJF010			X	2001
Ruins Site NE of Intersection (Area C)	EAJF011			X	2001
Ruins Site Area across from WPP	EAJF012			X	2001
Swamp 400 ft East of Ruins Site (Area D)	EAJF013			X	2001
Robbins Point Tower Site	EAJF014			X	2001
Titanium Pits Site	EAJF015			X	
Total	**17**	**2**	**1**	**15**	

[a]The ROD has been modified by an ESD (projected 2001).
[b]Portions remain active under RCRA permit, will be closed when appropriate.
[c]Drum removal action conducted.

This document is issued by the U.S. Army, the owner of the site, with the approval of the U.S. Environmental Protection Agency (EPA), Region III, the lead regulatory agency for Aberdeen Proving Grounds, Edgewood Area (APG-EA) remedial activities. The Maryland Department of the Environment (MDE), the support agency for this site, will provide its final decision on the **remediation** of this site after evaluating the community comments. Then, after all public comments received on the Proposed Plan have been reviewed and considered, the Army and EPA, will select the remedy for this site and present this remedy in the **Record of Decision**.

The Army is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)**, as amended, commonly known as the "Superfund Program," and the National Environmental Policy Act of 1969. The **Installation Restoration Program (IRP)** at APG is being conducted by the U.S. Army in compliance with CERCLA. The goal of CERCLA is to ensure that responsible parties identify, investigate, and clean up or contain contamination found at sites to levels that are protective of human health and the environment. The Army has worked in close coordination with EPA and MDE to investigate the groundwater contamination at APG J-Field, to evaluate potential cleanup methods, and to select the appropriate cleanup alternatives as presented herein.

1.1 Opportunities for Community Involvement

Community Meeting¾ Community members are encouraged to attend a community meeting at the Edgewood Senior Center, 1000 Gateway Drive, Edgewood, MD, on 20 March 2001. The poster sessions will be held from 4:00 p.m. to 5 p.m. and from 6:30 p.m. to 7:15 p.m., and a presentation will commence at 7:15 p.m. An additional community meeting will be held at the Chestertown Middle School Media Center, 402 East Campus Avenue, Chestertown, MD, on 22 March 2001. The poster session will commence at 6:30 p.m. and a presentation will be given at 7:15 p.m. The purpose of the meetings is to discuss the cleanup alternatives under consideration for the J-Field Study Area and to receive oral and written public comments. Further information or verification of meeting dates and locations may be gained by contacting APG's Information Line at (410) 272-8842 or (800) APG-9998.

A critical component of APG's program to keep the public informed about the post's environmental cleanup activities and involved in decision-making is the Restoration Advisory Board (RAB). The board gives community members, particularly those who may be affected by the cleanup activities, and government representatives a chance to exchange information and participate in meaningful dialogue. The RAB evolved into its current form in 1995 and has been active in the APG IRP process ever since. More information on the RAB may be found at its website, http://www.apg.army.mil/garrison/safety-environ/restor/Board/rab.htm.

Public Review and Comment Period¾ A 45-day public review and comment period on this Proposed Plan will be held from (schedule pending). All interested members of the public are encouraged to review and comment not only on the preferred alternative but also on the other cleanup options considered. The **Administrative Record,** which contains all the documents that will be used in selecting a remedy, is available for public inspection at the following locations:

Harford County Public Library -
Aberdeen Branch
21 Franklin Street
Aberdeen, MD 21001
(410) 273-5608

Hours: Mon, Tue, Thurs: 10 a.m. - 8 p.m.
Wed: 1 p.m. - 8 p.m.
Fri: 1 p.m. - 5 p.m.
Sat: 10 a.m. - 5 p.m.

Harford County Public Library -
Joppa Branch
655 Towne Center Drive
Joppa, MD 20185
(410) 612-1660

Hours: Mon, Tue, Thurs: 10 a.m. - 8 p.m.
Wed: 1 p.m. - 5 p.m.
Fri: 1 p.m. - 5 p.m.
Sat: 10 a.m. - 5 p.m.

Kent County -
Washington College
Miller Library
Chestertown, MD 21620
(410) 778-2800

Hours: Monday – Friday:
8:30 a.m. –10:00 p.m.
Sat: 10 a.m. –10 p.m.
Sun: 10 a.m. –10 p.m.
Summer: 8:30 a.m. –4:30 p.m.

Comments can be submitted either orally (at the community meeting) or in writing throughout the public comment period.

2. SITE BACKGROUND

APG is located along the Chesapeake Bay in southern Harford County, Maryland, approximately 15 miles northeast of Baltimore, Maryland (Figure 1). The installation is bordered to the east and south by the Chesapeake Bay; to the west by Gunpowder Falls State Park, the Crane Power Plant, and residential areas; and to the north by the towns of Edgewood, Magnolia, Perryman, and Aberdeen. APG is divided into two areas by the Bush River: the Edgewood Area lies to the west of the river and the Aberdeen Area lies to the east. The Edgewood Area is listed on the **National Priorities List** (NPL). A portion of APG was listed on the NPL on October 4, 1988, under the title of "Aberdeen Proving Ground (Michaelsville Landfill)," with EPA ID # MD3210021355. The remainder of the Edgewood Area was subsequently placed on the NPL. The NPL is EPA's list of hazardous waste sites in the United States that have high priority for remedial evaluation and response. The Army IRP is responsible for investigation and remediation of hazardous waste sites including actions under CERCLA, RCRA, and the National Environmental Policy Act (NEPA).

J-Field is located on the southern peninsula of the Edgewood Area (Figure 1). The contaminated groundwater plume in the J-Field Surficial Aquifer is confined to the Toxic Burning Pit (TBP) area (Figure 2).

This Proposed Plan addresses the contaminated groundwater plume under the J-Field Surficial Aquifer **Operable Unit** (OU.) In conjunction with revisions to the remedial action for the J-Field SOU under the Explanation of Significant Differences (ESD) and the completed corrective actions for the J-Field Confined Aquifer monitor wells described in this Proposed Plan, this will constitute the final Remedial Action for the J-Field Site. No further action is proposed for the remaining soil areas in the J-Field Study Area under CERCLA. Available data from Remedial Investigation activities do not indicate that these soil areas pose risk to human health or the environment.

Other operable units and sites which do not affect the J-Field Study Area remain active and open within the IRP at APG. This Proposed Plan (PP) addresses only the J-Field Operable Units and sites.

2.1 Activities at J-Field Area

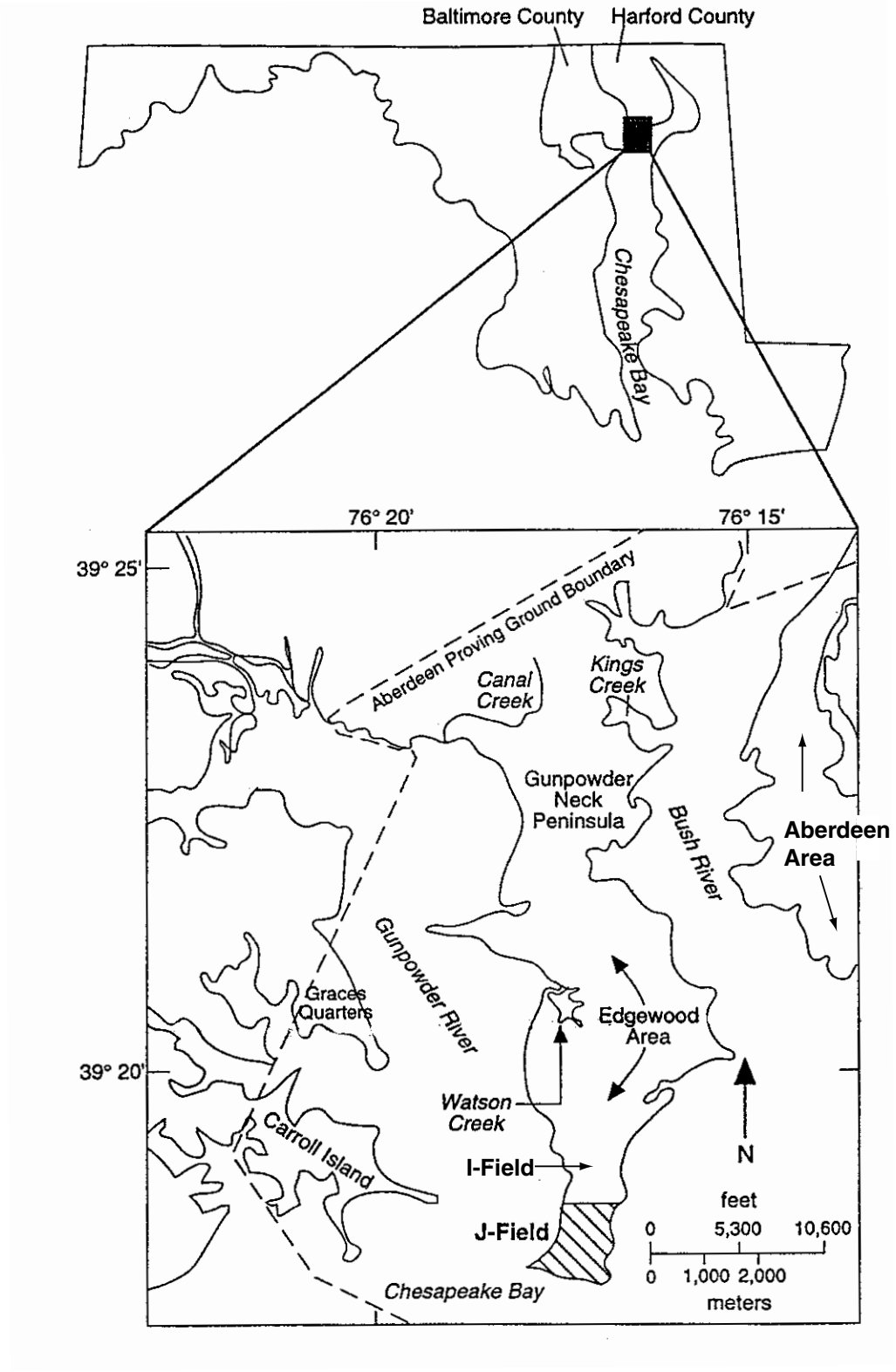
The Edgewood Area of APG has been a center for the development, testing, and manufacture of military-related chemicals since World War I. During World War II, J-Field was used for testing high explosives (HE) and munitions, and for thermal decontamination of chemical munitions. J-Field has had only limited use since 1980. However, some areas are still being used for the destruction of explosives-related materials. These activities are conducted under appropriate permits in accordance with applicable regulations. However, several limited areas at J-Field remain active for Open Burn / Open Detonation operations under APG's RCRA permit. These areas will be managed and closed (as appropriate) under the RCRA program when their use is no longer required for APG's mission.

2.2 Identification of Contaminant Plume

Former disposal practices at J-Field have resulted in soil and groundwater contamination. **Volatile organic compounds** (VOCs) are the primary chemicals found in the J-Field Surficial Aquifer. The contaminated plume is confined to the TBP Area located in the southeastern portion of J-Field (Figure 2). The VOC-contaminated plume is shown in the enlarged TBP area map in Figure 3.

The primary COPC in J-Field Surficial Aquifer groundwater is 1,1,2,2-tetrachloroethane (1,1,2,2-TeCA). Other COPCs include 1,2-dichloroethane (1,2-DCA), 1,1-dichloroethene (1,1-DCE), 1,2-dichloroethene (1,2-DCE) (total), tetrachloroethene (PCE), 1,1,2-trichloroethane (1,1,2-TCA), trichloroethene (TCE), and vinyl chloride (VC). A complete listing of contaminants of concern and corresponding regulatory criteria are given in Table 2-4 of the FS.

Several environmental investigations have been conducted at J-Field since the mid-1970s. These studies include: Environmental Contamination Survey conducted by the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), Munitions Disposal Study, RCRA Facility Investigation, Hydrological Assessment, Remedial Investigation, **treatability studies**, **Phytoremediation** Demonstration, groundwater plume modeling studies, and other field investigations. Summaries of these investigations are included in the Feasibility Study (FS).



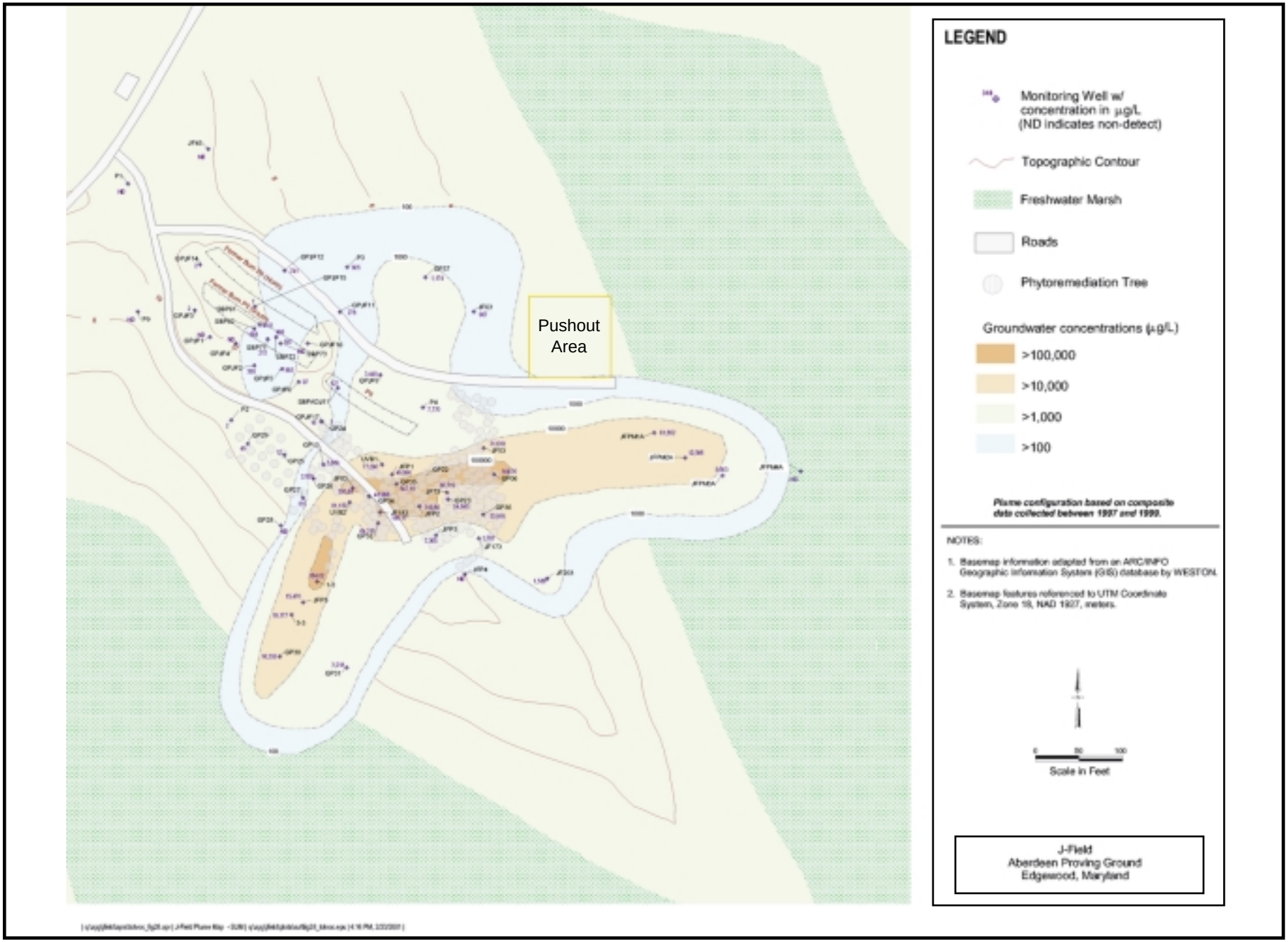
Source: Adapted from the Draft Final Remedial Investigation Report, June 1998.

01P-0230-1

FIGURE 1 LOCATION OF J-FIELD IN THE EDGEWOOD AREA AT THE ABERDEEN PROVING GROUND

01P-0230-2

FIGURE 2 LOCATIONS OF TOXIC BURNING PITS AREA WITHIN J-FIELD



01P-0230-4

FIGURE 3 CONTAMINATED PLUME SHOWING TOTAL VOC CONTOURS (1999 SAMPLING RESULTS)

2.3 Completed Activities at J-Field

2.3.1 Soil Operable Unit

A ROD was signed for the J-Field SOU on 27 September 1996. The September 1996 ROD specified limited removal of contaminated soils from the TBPs, followed by construction of a Protective Soil Blanket (PSB) to prevent ecological exposure. Additional remedial components included shoreline erosion controls along the southern shore of the Gunpowder Neck peninsula to prevent future erosion of contaminated materials into the bay. These measures will be described in Subsection 2.3.2.

The September 1996 ROD implementation was conducted from March 1998 through May 1999. During excavation, unexploded ordnance (UXO) and chemical warfare material (CWM) were encountered before excavation to specified cleanup criteria was completed in some areas. Hand excavation was subsequently required for worker safety. However, sufficient material has been removed to permit construction of the PSB as originally described in the September 1996 ROD. The Army has evaluated the potential for migration of remaining contaminants to ecological **receptors**. Based upon the results of this evaluation and the issues associated with excavation of the remaining materials, the Army is modifying the remedial action at the TBP from that described in the September 1996 ROD to include work completed to date, followed by construction of the PSB as originally planned.

Excavation of the Northern and Southern Main Burning Pits and the Pushout Area will not proceed beyond the materials already excavated. At this point, limited areas of arsenic and lead contamination remain above the intended cleanup performance standards. However, the overall depth of the excavation meets the 2-ft minimum depth specified in the September 1996 ROD, and the PSB will be constructed in full accordance with the September 1996 ROD, consisting of a minimum of 2 feet of clean backfill underlain by geotextile as a barrier to burrowing animals. Therefore, the completed system will function as intended and the intent of the original design will be fulfilled. Additional excavation would not enhance the protectiveness of the remedy. Additionally, the J-Field Study Area is located in the Edgewood restricted area of APG. Access to the restricted area is strictly controlled and a wide variety of physical security measures are in place to prevent unauthorized personnel from entering the area.

This modification is being accomplished through an Explanation of Significant Differences (ESD) which was signed by the Army in March 2001.

2.3.2 Shoreline Erosion Control

Shoreline Erosion Controls (SECs) were installed between September 1998 and April 1999 as specified in the J-Field SOU September 1996 ROD. The J-Field Shoreline stabilization system mitigates shoreline erosion of approximately 3,000 feet of the J-Field shoreline along the Chesapeake Bay from Ricketts Point to the eastern edge of Big Pond, and thereby protects freshwater marsh habitats and Big Pond, and prevents migration of hazardous materials. The system consists of on-shore revetments and off-shore breakwaters. Construction details are provided in the *Final Technical Report (As–Built)* (WESTON, 1999). Following construction of the revetments and breakwaters, the area was vegetated with 32,000 wetland plants (*Spartina patens* and *Scirpus americanus*) to provide support to the beach nourishment system. To maintain some intertidal exchange along the shoreline as requested by the U.S. Fish and Wildlife Service, a portion of the shoreline remains unprotected. Erosion in this area will be monitored as presented in *Post Construction Survey Monitoring Program for J-Field Shoreline Protection Project* (WESTON, September 2000).

Work was completed in April 1999. Inspection of the area in the summer of 1999 showed that establishment of the vegetative layer is proceeding. After extensive agency review, the shoreline protection system was deemed appropriate by the Directorate for Safety, Health, and Environment (DSHE) and compliant with September 1996 ROD requirements to protect the eroding shoreline from further damage, while protecting valuable habitat.

2.3.3 Confined Aquifer Corrective Actions

In 1989, a series of monitor wells was installed in the First Confined Aquifer that underlies J-Field to examine groundwater quality (USGS, 1993). Over the ensuing monitoring periods, sampling of these wells indicated that

localized VOC contamination existed in the Confined Aquifer downgradient of the Former Toxic Burning Pits (Argonne, 1997). The source of contamination was uncertain but was suspected to originate as leakage from the overlying Surficial Aquifer during the 1989 Confined Aquifer well installation activities. Due to range closures during well installation, the well boreholes were left open and may have provided a path for downward leakage of VOCs. Between 1989 and 1999, sampling of Confined Aquifer water quality indicated that VOC concentrations were declining in several of the wells (JF-41, -51, -61, and –71) to near background levels. In contrast, concentrations in JF-81 continued to increase during this period, suggesting the existence of another possible VOC source to the Confined Aquifer.

Examination of well construction records for the Confined Aquifer wells showed that the wells were not double cased to seal off the Surficial Aquifer. A borehole geophysical study was conducted on the monitor wells screened in the Confined Aquifer to evaluate their integrity and determine if downward leakage through the borehole(s) was possible. Results indicated that grout loss and cracking occurred in all the wells and indicated that JF-81 and JF-82 also suffered from thin bentonite seals above the sand pack. It was determined that these construction problems provided a path for VOC contamination in the Surficial Aquifer to migrate through the clay layer to the First Confined Aquifer.

As a result, JF-81 and –82 were abandoned and sealed. Two double-cased downgradient wells (JF-211 and –221) and one replacement well (JF-81R) were installed (WESTON, 2001). Groundwater sampling was conducted to assess the extent of contamination in the First Confined Aquifer and borehole geophysical testing was conducted to confirm well construction quality. Results of the sampling indicated that of the three downgradient monitor wells, only MW-221 indicated detectable VOCs although concentrations were below the respective MCLs. The downward trend of VOCs historically observed in the Confined Aquifer wells was interrupted by elevated concentrations of cis-1,2-DCE and VC in JF-51 and PCE in JF-61. The cause for this unsuspected increase in VOCs is not clearly understood but could be related to several factors including (1) seasonal variation, (2) variable flow conditions, (3) possible construction issues at other well(s), and (4) the possibility that the VOCs were drawn over to JF-51 from the area around JF-81 during recent well construction. As part of the Alternative Remedial Strategy presented in Section 3 of this document, JF-51 will be abandoned, sealed, and replaced. Monitoring of the Confined Aquifer will be continued. Figure 4 presents the current monitor well network for the First Confined Aquifer at J-Field. Additional monitoring will be conducted to further evaluate the effectiveness of this action and determine the need for any additional actions.

2.3.4 Miscellaneous Actions

In addition to the items listed in the previous subsections, the following investigative or cleanup-related activities have also been conducted at J-Field:

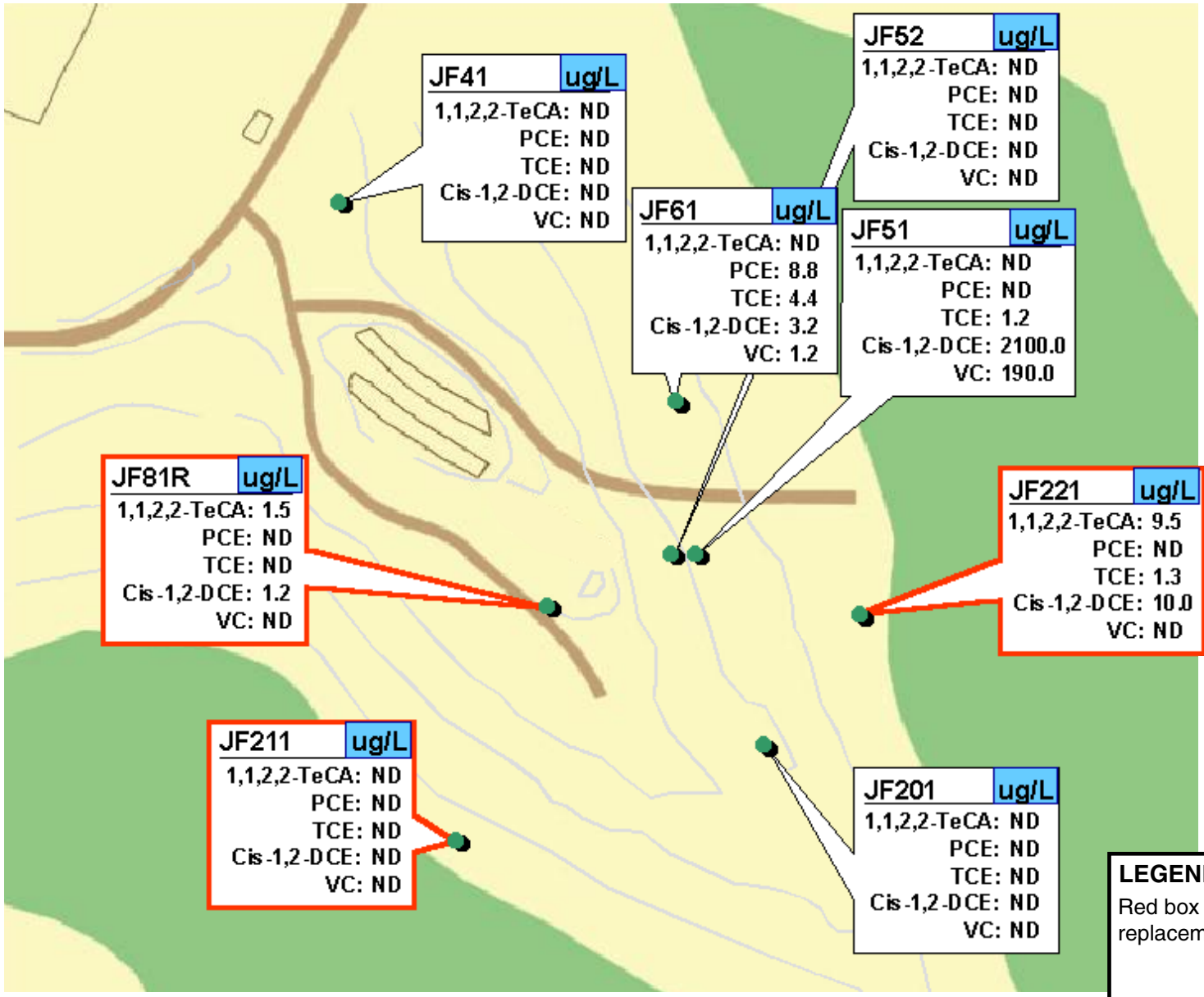
- Geochemical Evaluation of Arsenic and Lead Mobility.
- Biosolids Demonstration in Pushout Area.
- Drum Removal Action.
- Removal of J-Field Soil / Debris Piles.

Additional detail for these activities is available in the ESD. A compilation of the investigative activities at J-Field is shown in Table 1 of this Proposed Plan.

2.4 Scope and Role of Action

In accordance with CERCLA, a **Feasibility Study** (FS) was conducted for the J-Field Surficial Aquifer to identify and evaluate long-term remedial action for the mass removal of VOCs from the J-Field Surficial Aquifer. The FS was conducted in accordance with the CERCLA Remedial Investigation / Feasibility Study (RI / FS) Guidance. Investigative activities, which were conducted before and after the FS, were listed in Table 1 of this document. The J-Field area is

Figure 4 Confined Aquifer Sampling Results



01P-0230-3

FIGURE 4 CONFINED AQUIFER SAMPLING RESULTS (OCTOBER 2000)

not currently being used, and will not be used in the future, for residential purposes. Furthermore, J-Field Surficial Aquifer groundwater will not be used for any purpose in the future. The U.S. Army expects to continue to use the J-Field area for industrial purposes only. Therefore, groundwater from the contaminated plume will not be used for drinking water purposes in the future.

The **Human Health Risk Assessment** (HHRA) conducted during the Remedial Investigation (RI) did not evaluate groundwater because it was determined that there are no complete **exposure pathways** for groundwater. The human health and **ecological risk assessments** are discussed in Section 2.5.

The ecological risk assessment submitted in the RI indicated that there are no significant ecological receptors of the Surficial Aquifer groundwater in the vicinity of the TBP area where groundwater contamination has been found.

The COPCs were identified only in the case of hypothetical residential scenarios evaluated in the addendum to the human health risk assessment, as discussed below.

The selected remedy for the J-Field Surficial Aquifer will represent the best balance of required and preferred features, as defined by CERCLA guidance and the **National Oil and Hazardous Substances Pollution Contingency Plan** (NCP).

If not addressed by one of the measures considered, there is a potential for contaminants associated with the Surficial Aquifer to migrate to the adjacent marsh areas east and south of the TBP area (indicated by dark green in Figure 4) which could cause a threat to the environment.

2.5 Summary of the Risk Assessment

Risk Assessment from the J-Field RI indicated that there were no complete exposure pathways for groundwater; therefore, groundwater was not evaluated in the human health risk assessment. Consequently, COPCs were not identified. In November 1998, an addendum to the human health risk assessment was submitted in which human health risks due to groundwater were evaluated for several hypothetical residential scenarios. It was determined that the potential cumulative risks associated with hypothetical child and adult resident exposures to groundwater at J-Field were well above EPA's target risk range for health protectiveness at Superfund sites. The study also indicated that noncarcinogenic effects could occur if persons were exposed. The predominant VOCs associated with high cancer risks and noncancer hazards in groundwater included 1,2-DCA; 1,1,-DCE; 1,2-DCE (total); 1,1,2,2-TeCA; PCE, 1,1,2-TCA; TCE; and VC.

The ecological risk assessment submitted in the RI indicated that groundwater is not a potential ecological receptor for the TBP area where the contaminated groundwater plume is located.

3. SUMMARY OF THE REMEDIAL ALTERNATIVES

3.1 Description of Remedial Alternatives

The following six remedial alternatives were developed in the FS to address the contaminated plume in the J-Field Surficial Aquifer:

- Alternative 1 No Action (required by CERCLA to be considered for comparison reasons).
- Alternative 2 **Institutional Controls**.
- Alternative 3 Phytoremediation with Institutional Controls.
- Alternative 4 Monitored Natural Attenuation (MNA) with Institutional Controls and Phytoremediation.
- Alternative 5 Integrated Remedial System: In Situ Source Area Treatment Using Groundwater Circulation Wells (GCW), MNA, and Phytoremediation.
- Alternative 6 Integrated Remedial System: Source Area Treatment Using Groundwater Pumping, Transport and Off-Site Treatment of Groundwater, MNA, and Phytoremediation.

Estimated costs for all the alternatives were calculated for 30 years for consistency and comparison purposes. The costs presented in this Proposed Plan for these 6 alternatives are found in the FS Addendum available in the Administrative Record.

3.1.1 Alternative 1: No Action

CERCLA and the NCP require that the No Action alternative be evaluated at every Superfund site to establish a baseline for comparison. In some cases, No Action may be found to be the appropriate alternative for implementation. This alternative as presented in the J-Field Surficial Aquifer FS includes the following components:

- No active remedial activities would take place under the No Action alternative.
- As required under CERCLA, the site would be reviewed after 5 years to reassess site conditions. These CERCLA reviews are proposed for this and every other alternative in this Proposed Plan. They will be conducted every 5 years for 30 years.

Cost Summary

Alternative 1

Capital Cost	$0
CERCLA Review (for one 5-year review)	$43,200
Total Present Worth Costs (30 years)	$120,000

3.1.2 Alternative 2: Institutional Controls

The Institutional Controls alternative would include the 5-year CERCLA review as in the No Action alternative, access and deed restrictions, and proper documentation of this information. This alternative as presented in the J-Field Surficial Aquifer FS involves:

- 5-year CERCLA reviews for 30 years.
- Prohibition of untreated groundwater use in order to prevent exposure to the contaminants found in groundwater.
- Prohibition of unauthorized excavation and well installation at the site.
- Posting of signs stating site restrictions / prohibitions (maintained for 30 years).
- Incorporation of all site restrictions / prohibitions into APG's Geographical Information System (GIS), which is used in the development of APG's Real Property Master Plan.
- Inclusion of all site restrictions / prohibitions, a discussion of the NPL status of the site, and a description of the chemical profile and the potential risks associated with the soil and groundwater in any real property or real estate documents necessary for the transfer of ownership from the Army (in the unlikely event that the Army transfers this property). This will ensure that any future property transfers recognize and continue necessary institutional controls.

Cost Summary

Alternative 2

Capital Cost	$18,000
CERCLA Review	$120,000
Operations and Maintenance (O&M) Costs	$28,000
Total Present Worth Cost (30 years)	$166,000

3.1.3 Alternative 3: Phytoremediation with Institutional Controls

This alternative as presented in the J-Field Surficial Aquifer FS includes the following:

- 5-year CERCLA reviews for 30 years.
- Institutional controls as described in Alternative 2.
- Periodic sampling and analysis of groundwater, periodic measurement of groundwater elevation, and periodic monitoring of tree sap flow.
- Periodic sampling and monitoring of phytoremediation trees, and planting of new trees to replace damaged or dead ones.
- Maintenance of trees as needed, such as pruning trees during their growing season.

Cost Summary

Alternative 3

Capital Cost: Institutional Controls	$18,000
CERCLA Review	$120,000
O&M Costs: Institutional Controls	$28,000
O&M Costs: Phytoremediation	$953,000
Total Present Worth Cost (30 years)	$1,119,000

3.1.4 Alternative 4: MNA with Institutional Controls and Phytoremediation

The Monitored Natural Attenuation (MNA) alternative as presented in the J-Field Surficial Aquifer FS involves the following:

- 5-year CERCLA reviews for 30 years.
- Institutional controls as described in Alternative 2.
- Continuation of the phytoremediation demonstration as described in Alternative 3.
- Quarterly groundwater sampling during the first 4 years to help confirm that the plume is stable, or determine the direction of movement if it is migrating, and to establish a baseline for MNA performance verification. After the first 4 years, annual sampling would be conducted.

Cost Summary

Alternative 4

Capital Cost: Institutional Controls	$18,000
CERCLA Review	$120,000
O&M Costs: Institutional Controls	$28,000
O&M Costs: Phytoremediation	$953,000
O&M Costs: MNA	$779,000
Total Present Worth Costs (30 years)	$1,898,000

3.1.5 Alternative 5: Integrated Remedial System: In Situ Source Area Treatment Using GCW, MNA, and Phytoremediation

This alternative as presented in the J-Field Surficial Aquifer FS includes the following:

- 5-year CERCLA reviews for 30 years.
- Institutional controls as in Alternative 2.
- Continuation of phytoremediation demonstration as described in Alternative 3.
- Continuation of MNA demonstration as described in Alternative 4.
- Installation of four GCWs (Granular Activated Carbon treatment was used for costing purposes).
- Periodic monitoring of groundwater.
- Periodic well maintenance as needed, including check for proper performance of equipment, replacement of carbon canisters, periodic well redevelopment, and periodic removal of deposits from well screens.

Cost Summary

Alternative 5

Capital Cost: Institutional Controls	$18,000
Capital Cost: GCW	$970,000
CERCLA Review	$120,000
O&M Costs: Institutional Controls	$28,000
O&M Costs: Phytoremediation	$953,000
O&M Costs: MNA	$779,000
O&M Costs: GCW	$2,413,000
Total Present Worth Cost (30 years)	$5,281,000

3.1.6 Alternative 6: Integrated Remedial System: Source Area Treatment Using Groundwater Pumping, Transport and Off-site Treatment of Groundwater, MNA, and Phytoremediation

This alternative as presented in the J-Field Surficial Aquifer FS includes two options, depending on the treatment location. Option A involves treatment of groundwater at the Old O-Field treatment plant at APG, and Option B involves treatment of groundwater at an off-site commercial treatment facility.

This alternative includes the following:

- 5-year CERCLA reviews for 30 years.
- Institutional controls as described in Alternative 2.
- Continuation of phytoremediation demonstration as described in Alternative 3.
- Continuation of MNA demonstration as described in Alternative 4.
- Installation of four groundwater **extraction** wells.
- Installation of groundwater pumping systems on four wells.
- Installation of a temporary 10,000-gal. tank (to hold approximately 3 to 4 days' volume of recovered groundwater at a total recovery rate of 2 gallons per minute [gpm] from all wells) to store extracted groundwater.
- Periodic trucking of groundwater to the Old O-Field treatment plant or to an off-site commercial treatment plant for treatment and discharge.

Cost Summary

Alternative 6

Capital Cost: Institutional Controls	$18,000
Capital Cost: GW Extraction Wells	$174,000
CERCLA Review	$120,000
O&M Costs: Institutional Controls	$28,000
O&M Costs: Phytoremediation	$953,000
O&M Costs: MNA	$779,000
O&M Costs: GW Extraction Wells Option A Option B	 $4,334,000 $16,434,000
Total Present Worth Cost (30 yrs) Option A Option B	 $6,406,000 $18,506,000

3.1.7 Technical Impracticability Evaluation

The Technical Impracticability (TI) Evaluation considers sequentially the following options:

- Treatment of entire contaminated plume.
- Containment of sorbed residual contaminant.
- If dense nonaqueous phase liquid (DNAPL) containment is achievable, treatment of the remaining portion of the plume.

All of these options were found to be technically impracticable. Treatment of the entire plume is not practicable because of the results of the Treatability Studies and the difficulties in pumping water from the Surficial Aquifer. Containment of the DNAPL is not practicable due to prohibitive costs associated with the large area to be contained and costs associated with UXO clearance. Likewise, removal of the DNAPL through excavation would be prohibitively expensive. Further, DNAPL containment would not decrease contaminant mobility and would create a hydraulically contained area that would require dewatering.

As part of the TI Evaluation, an Alternative Remedial Strategy was developed in order to provide protectiveness at the J-Field Study Area. This Alternative Remedial Strategy will include establishing Institutional Controls, continuation of the phytoremediation demonstration, monitoring **biodegradation** processes, abandonment and replacement of Confined Aquifer well JF-51, possible addition of a supplement to the replacement well for JF-51 to foster degradation of the isolated contamination at JF-51 in the Confined Aquifer, and continued monitoring of the Confined Aquifer. The Alternative Remedial Strategy may be implemented following EPA's approval of the TI waiver. This action will consist of the following components:

- 5-year CERCLA reviews for 30 years.
- Prohibition of untreated groundwater use to prevent human exposure to the contaminants found in groundwater.
- Prohibition of unauthorized excavation and well installation at the site.
- Posting and maintenance of signs stating site restrictions / prohibitions .
- Incorporation of all site restrictions / prohibitions into APG's Geographical Information System (GIS), which is used in the development of APG's Real Property Master Plan.
- Inclusion of all site restrictions / prohibitions, a discussion of the National Priorities List (NPL) status of the site, and a description of the chemical profile of the groundwater in any real property or real estate documents necessary for the transfer of ownership from the Army (in the unlikely event that the Army transfers this property). This will ensure that any future property transfers recognize and continue necessary institutional controls.
- Periodic sampling and analysis of groundwater.
- Periodic sampling and monitoring of phytoremediation trees, which may include measurements of sap flow, tree tissue, and / or other sampling, and planting of new trees as needed to replace damaged or dead ones. Following planting, the health of the trees would be assessed periodically as the trees become established on the site. Fertilizer and soil amendments may continue to be required, and it may be necessary to prune the trees during their growing season.
- Groundwater sampling for COPCs and monitoring of attenuation and biodegradation parameters to help determine whether the plume is stable or migrating, and the direction of migration of the plume.
- Abandonment and replacement of Confined Aquifer Well JF-51.
- Monitoring of the Confined Aquifer for the Surficial Aquifer COPCs.

- The addition of a supplemental material to foster degradation of the isolated contamination at JF-51 in the Confined Aquifer will be considered in the Remedial Design.

This alternative differs from the alternatives presented in the FS in that:

- Additional trees will be planted as part of the Alternative Remedial Strategy.
- Phytoremediation sampling was decreased based on previous site experience.
- Confined Aquifer actions (including abandonment and replacement of JF-51) were included and Confined Aquifer wells included in the monitoring strategy.

Costs of the Alternative Remedial Strategy are summarized below.

Cost Summary

Alternative Remedial Strategy

Capital Cost: Institutional Controls	$18,000
Capital Cost: UXO	$190,000
Capital Cost: Phytoremediation	$50,000
Capital Cost: Confined Aquifer Well Abandonment and Replacement	$70,000
CERCLA Review	$120,000
O&M Costs: Institutional Controls	$28,000
O&M Costs: Phytoremediation	$681,000
O&M Costs: Biodegradation parameters	$632,000
Total Present Worth Costs (30 years)	$1,789,000

3.2 Evaluation of Alternatives and the Preferred Alternative

The Alternative Remedial Strategy proposed for this site includes establishing Institutional Controls, continuation of the phytoremediation demonstration, and monitoring biodegradation processes. Based on current information, this alternative provides the best balance of trade-offs among the alternatives with respect to the nine CERCLA Evaluation criteria (Table 3) discussed below. A graphical comparison of the six alternatives from the FS and the Alternative Remedial Strategy is shown as Figure 5.

3.2.1 Threshold Criteria

The two threshold CERCLA Evaluation criteria are (1) overall protection of human health and the environment and (2) compliance with **Applicable or Relevant and Appropriate Requirements** (ARARs).

3.2.1.1 Overall Protection of Human Health and the Environment

Alternative 1 would not be protective of human health or the environment. Alternative 2 would provide protection to humans by implementation of the Institutional Controls. As shown in the Risk Assessment, there are no complete groundwater exposure pathways and will not be in the future. In the unlikely event that the property is transferred, institutional controls will still prevent groundwater use. Long-term monitoring will be added to the selected alternative to allow assessment of any changes in site conditions. Alternatives 3 and 4 are passive processes, which would require

a longer time to make a significant difference in protection to humans or the environment than some processes. Alternatives 5 and 6 are focused on source control by treatment or disposal of contaminants. By active treatment of contaminants, these alternatives would provide adequate protection in a relatively shorter time. However, in the longer term, the performance of Alternative 3 is essentially the same as Alternatives 5 and 6. The

Table 3
CERCLA Evaluation Criteria from the NCP

Criteria Category	Criteria	Description
Threshold	Overall Protection of Human Health and the Environment	Addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.
	Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)	Addresses whether or not a remedy will meet all of the applicable or relevant and appropriate federal and state environmental statutes and requirements or whether grounds exist for invoking a waiver.
Primary Balancing	Long-Term Effectiveness and Permanence	Refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.
	Reduction of Toxicity, Mobility, and Volume Through Treatment	Refers to the anticipated performance of the treatment technologies a remedy may employ.
	Short-Term Effectiveness	Addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until the cleanup goals are achieved.
	Implementability	Refers to the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.
	Cost	Includes the estimated capital and operation and maintenance costs and net present worth costs of each alternative.
Modifying	State / Support Agency Acceptance	Indicates whether, based on a review of the RI / FS reports and Proposed Plan, the state / support agency concurs, opposes, or has no comment on the preferred alternative at the present time.
	Community Acceptance	Will be assessed in the Record of Decision (ROD) following review of the public comments received on the Proposed Plan.

Each alternative was evaluated using the nine EPA evaluation criteria described above. Using the results of this evaluation, the Army compared the alternatives and selected the preferred cleanup alternative for the site presented in this Proposed Plan.

Figure 5
Evaluation of Remedial Alternatives

Proposed Alternative	1. Overall Protection of Human Health and the Environment	2. Compliance with ARARs	3. Long-Term Effectiveness and Permanence	4. Reduction in Toxicity, Mobility or Volume Through Treatment	5. Short-Term Effectiveness	6. Implementability	7. Cost (Net Present Worth in $1,000s)	8. State Acceptance (Under Review)	9. Community Acceptance
1. No Action	○	○	○	○	○	●	$120,000	TBD	TBD
2. Institutional Controls	●	○	⊖	○	⊖	●	$166,000	TBD	TBD
3. Phyto with IC	●	⊖	⊖	⊖	⊖	●	$1,119,000	TBD	TBD
4. MNA, IC, Phyto	●	⊖	●	●	⊖	●	$1,898,000	TBD	TBD
5. GCW, MNA, Phyto	●	⊖	●	●	⊖	○	$5,281,000	TBD	TBD
6. Pump and Truck with MNA, Phyto	●	⊖	●	●	⊖	○	$6,406,000 $18,506,000	TBD	TBD
ARS	✓	●	●	●	●	⊖	●	$1,789,000	TBD	TBD

Ranking Keys: ● Fully meets criteria ⊖ Partially meets criteria ○ Does not meet criteria

recommended Alternative Remedial Strategy would be protective of Human Health and the Environment through the implementation of Institutional Controls as well as the ongoing phytoremediation and natural processes.

3.2.1.2 Compliance with ARARs

CERCLA, as amended, requires that remedial actions at NPL sites consider other laws and regulations that may be applicable to the site or that address situations sufficiently similar to those at the site to be considered relevant and appropriate. These other laws and regulations, termed ARARs, may be:

- Chemical-specific (addressing requirements for managing the site contaminants).
- Action-specific (requirements that may apply to specific types of remedial actions under consideration).
- Location-specific (requirements that are related to the location of the site).

Chemical-Specific ARARs—There are no applicable chemical-specific ARARs associated with J-Field groundwater. 40 CFR 264.94 provides **Maximum Concentration Limits** (MCLs) for selected chemicals and guidelines for establishing **Alternate Concentration Limits** (ACLs) for chemicals which do not have MCLs as defined in the Safe Drinking Water Act (SDWA) (40 CFR 141.11-141.16, 141.50 141.51, 141.61, 141.62); (42 U.S. Code [USC] 300f, 300g, 300g-1, 300g-2, 300g-3, 300g-4, 300g-5, 300g-6, 300j-4; and 300j-9). However, RCRA groundwater protection standards referenced in Chapter 40 of Code of Federal Regulations (CFR) Section 264.94 are not applicable to J-Field groundwater since the TBPs are not regulated units. The TBPs are solid waste management units and would be subject to the requirements of 40 CFR 264.101 and 40 CFR 264.552; however, the Federal Facility Agreement provides that a remedial action under CERCLA meets and is equivalent to corrective action under RCRA. None of the Alternatives evaluated are likely to achieve compliance with MCLs. As previously stated, the requirement to comply with ARARs is being waived due to the technical impracticability of restoring groundwater to MCLs.

Action-Specific ARARs—Action-specific ARARs are not relevant to Alternative 1 because there are no active remedial measures associated with this alternative. Occupational Safety and Health Administration (OSHA) requirements during site construction would be satisfied in Alternatives 2 through 6. Site work associated with institutional controls and monitoring under Alternative 2 would meet action-specific ARARs. Action-specific ARARs associated with Alternatives 3 and 4, such as planting of new trees and installation of additional monitoring wells (if required), would be met. These action-specific ARARs would also be met by the Alternative Remedial Strategy. Action-specific ARARs associated with Alternative 5, such as well drilling regulations and VOC emission requirements from the GCW system, would be met. In Alternative 6, action-specific ARARs associated with well drilling, modifications to the Old O-Field treatment plant (if this option is selected and if modifications are required), and Department of Transportation (DOT) regulations on transportation of groundwater to the off-site treatment plant (if this option is selected), would be met. Action-specific ARARs are summarized in Table A-1.

Location-Specific ARARs—Location-specific ARARs are not relevant to Alternative 1 because there are no active remedial measures associated with this alternative. Site work associated with institutional controls and monitoring under Alternative 2 would meet location-specific ARARs. In Alternatives 3 and 4, activities associated with planting of additional trees would meet applicable location-specific ARARs. Location-specific ARARs would also be met by the Alternative Remedial Strategy. Location-specific ARARs would also be met in Alternatives 5 and 6 during installation of wells, placement of the temporary storage tank (Alternative 6), etc. Location-specific ARARs are summarized in Table A-2.

3.2.2 Primary Balancing Criteria

The following five primary balancing CERCLA Evaluation criteria are used to assess the relative advantages and disadvantages of the alternatives to determine the most appropriate solution for a given site:

- Long-Term Effectiveness and Permanence.
- Reduction of Toxicity, Mobility, or Volume of Contaminants Through Treatment.
- Short-Term Effectiveness.
- Implementability.
- Cost.

The first and second balancing criteria address the statutory preference for treatment as a principal element of the remedy and the preference to not use off-site disposal of untreated waste as the remedy method. Along with the third, fourth, and fifth balancing criteria, they form the basis for determining the general feasibility of the remedy and whether costs are consistent with the overall effectiveness, considering both the cleanup period and the time following cleanup. By this means, it can be determined whether the remedy is cost-effective.

3.2.2.1 Long-Term Effectiveness and Permanence

In Alternative 1, a verifiable reduction in residual risk is not expected in the foreseeable future because there is no contaminant removal or treatment mechanism in place and no monitoring program is provided to assess performance. Future risk could remain due to the undetected movement of the contaminated plume to the marsh. The additional institutional controls used in Alternative 2 will preclude exposure of receptors to untreated groundwater by interrupting the exposure pathway. Monitoring can be added to Alternative 2 to verify that exposure scenarios do not change. A gradual reduction in risk is expected in Alternatives 3 and 4 and for the Alternative Remedial Strategy due to contaminant degradation or restoration processes by phytoremediation and biodegration. Because limited long-term performance information is available on these technologies, the actual progress can be measured only through the monitoring program.

A reduction in risk can also be expected in Alternative 5. Although GCW systems have proven to be successful at many sites, site conditions as described in the TI Evaluation make its implementation at J-Field ineffective. Permanent removal of contaminants from groundwater makes the engineering controls used in this alternative adequate and reliable. The pump-and-treat or dispose technology used in Alternative 6 is the most reliable method of reducing the risk posed by contaminants. In this alternative, all of the groundwater that enters the well is pumped out completely, instead of recirculating a portion of it back to the aquifer as in Alternative 5. Therefore, the mass removal of contaminants may be more expeditious. As with Alternative 5, this process will be restricted by the low permeability soils and the presence of residual DNAPL.

3.2.2.2 Reduction of Toxicity, Mobility, and Volume

In Alternatives 1 and 2, a reduction in toxicity, mobility, and volume is not expected in the foreseeable future. In Alternatives 3 and 4 and in the Alternative Remedial Strategy, a reduction in toxicity, mobility, and volume of contaminants is expected over time through biodegradation and/or **abiotic** degradation of contaminants. The degree of reduction in toxicity, mobility, and volume of the parent compounds, as well as the toxicity and volume of the degradation products, need to be evaluated through the periodic monitoring program. In Alternative 5, the mobility of the contaminants would be reduced by removing them from groundwater. The toxicity and volume would be reduced only if the contaminants removed by the treatment system were chemically destroyed during the operations. However, permanent removal of contaminants from groundwater would reduce the overall toxicity and volume of contaminants in J-Field groundwater. In Alternative 6, the mobility of the contaminants would be reduced by the removal of contaminants from groundwater. The toxicity and volume of the contaminants would also be reduced by treatment and/or destruction of contaminants at the Old O-Field treatment plant or at an off-site treatment plant.

3.2.2.3 Short-Term Effectiveness

There is no additional short-term risk to the community or the workers in Alternative 1 because there are no remedial activities to be implemented. Alternative 2 includes minor site activity such as posting signs indicating that the area poses a potential threat to the community or the workers. Risk to site workers from these activities can be easily controlled. There would be minimal additional risk in Alternatives 3 and 4 and in the Alternative Remedial Strategy during planting of trees, well drilling (if any additional monitoring wells are required), and sampling activities. In Alternative 5, workers would be protected from noise, dust, and construction hazards by taking appropriate safety precautions. Air emissions from the GCW system would be controlled in accordance with emission requirements. There would be no significant effect on the community because no one lives or works in the TBP area or in the vicinity. In Alternative 6, workers would be protected from noise, dust, and construction hazards by taking appropriate safety measures. Precautions would be taken to prevent spillage of groundwater when transferring stored groundwater from the temporary tank to the truck, during the transport process, and when discharging to the Old O-Field or off-site treatment plant.

3.2.2.4 Implementability

There are no technical or administrative issues associated with the implementation of Alternatives 1 and 2. Alternatives 3 and 4 can be implemented easily because the only activities associated with these alternatives are planting of additional trees and sampling activities. In Alternative 3 and the Alternative Remedial Strategy, sampling and monitoring activities can be performed by employing personnel trained in phytoremediation-related work. Implementation of Alternative 5 requires vendor involvement because the GCW process is patented. Installation of GCWs can be performed by local contractors specializing in well installation. Equipment must be ordered in advance to meet schedule requirements. Installation of groundwater extraction wells in Alternative 6 can be performed by local contractors specializing in well installation. All alternatives involving invasive construction activities (Alternatives 2 through 6) would require UXO clearance. Transportation of groundwater can be accomplished using a dedicated truck. If any modifications are needed to the Old O-Field treatment plant, they can be performed using local vendors specializing in water treatment equipment and installation.

3.2.2.5 Cost

Total present worth costs were estimated for the six alternatives for a period of 30 years. Costs for CERCLA reviews were calculated based on one review every 5 years for 30 years. Detailed estimates for capital and O&M costs are included in the FS. Note that the costs associated with the Alternative Remedial Strategy are found in the TI Evaluation which is Appendix C of the FS. A summary of present worth costs for the comparative evaluation of the alternatives as presented in the FS is as follows:

Present-Worth Cost	
Alternative 1:	$120,000
Alternative 2:	$166,000
Alternative 3:	$1,119,000
Alternative 4:	$1,898,000
Alternative 5:	$5,281,000
Alternative 6:	Option A $6,406,000 Option B $18,506,000
Alternative Remedial Strategy	$1,789,000

3.2.3 Modifying Criteria

3.2.3.1 State/Support Agency Acceptance

The EPA and MDE will make their final decision on the remedial action for the J-Field Surficial Aquifer when all community comments have been evaluated.

3.2.3.2 Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends. This information will be considered during selection of the cleanup alternative for the site. Community acceptance will be addressed in the Responsiveness Summary prepared for the Record of Decision for the site.

3.2.4 Summary of the Preferred Alternative

The Alternative Remedial Strategy as presented in the TI Evaluation is the preferred alternative since it best satisfies the threshold CERCLA Evaluation Criteria of Overall Protectiveness and Compliance with ARARs. (Compliance with MCLs is being waived due to the technical impracticability of restoring this groundwater.) Other criteria are also satisfied and the alternative is cost-effective in comparison with other alternatives.

In this Alternative, the implementation of Institutional Controls would involve the posting of signage prohibiting unauthorized excavation, the restriction of groundwater use in order to prevent exposure risks associated with contaminated groundwater, and the incorporation of such restrictions in the Installation Master Plan. The ongoing Phytoremediation demonstration would be continued, including planting of additional trees and maintenance and monitoring for all trees involved in the study. Groundwater would be monitored for contaminants as well as for biodegradation parameters to assess the ongoing natural biodegradation processes which are treating the contaminants. This monitoring would be conducted for 30 years (or longer if warranted). CERCLA reviews would be conducted every 5 years for a period of 30 years.

The Alternative Remedial Strategy provides long- and short-term protection to human health and the environment through use restrictions. The adequacy and reliability of the Institutional Controls for restricting groundwater use is considered high. Because no groundwater will be extracted, the alternative creates no additional risks to the community, workers, or the environment due to the construction of an extraction and treatment system.

The Alternative Remedial Strategy provides contaminant mass reduction through Phytoremediation and biodegradation processes, thus providing reduction in the toxicity, mobility, and volume of the contaminated groundwater.

The Alternative Remedial Strategy is considered easy to implement. Actions to be taken are limited to the posting of signage; the prevention of groundwater use to be regulated by the Army; and the implementation of a monitoring program for contaminants and for attenuation, biodegradation, and phytoremediation parameters.

Based on the best information available at this time, the preferred alternative will be protective of human health and the environment through site management and will be cost-effective.

Through the environmental program to monitor for contaminants and biodegradation and phytoremediation parameters, the Army will be able to monitor the effectiveness of the remedy and determine whether adverse changes in risk have occurred at the site.

4. THE COMMUNITY'S ROLE IN THE SELECTION PROCESS

4.1 Public Comment Period

The Army and EPA are soliciting input from the community on all of the alternatives that have been proposed for the site. The comment period will extend from 9 March 2001 through 23 April 2001. The comment period includes an availability session at which the Army and EPA will present the FS Report and Addendum and Proposed Plan, answer questions, and accept both oral and written comments.

4.2 Community Meetings

Community members are encouraged to attend a community meeting at the Edgewood Senior Center, 1000 Gateway Drive, Edgewood, MD, on 20 March 2001. The poster sessions will be held from 4:00 p.m. to 5:00 p.m. and from 6:30 p.m. to 7:15 p.m., and a presentation will commence at 7:15 p.m. An additional community meeting will be held at the Chestertown Middle School Media Center, 402 East Campus Avenue, Chestertown, MD, on 22 March 2001. The poster session will be held from 6:30 p.m. to 7:15 p.m., and a presentation will be given at 7:15 p.m. The purpose of the meetings is to discuss the cleanup alternatives under consideration for the J-Field Study Area and to receive oral and written public comments. Further information or verification of meeting dates and locations may be gained by contacting APG's Information Line at (410) 272-8842 or (800) APG-9998.

4.3 Period of Decision and Responsiveness Summary

Comments will be summarized and responses provided in the Responsiveness Summary section of the Record of Decision. The Record of Decision is the document that presents the remedy selected for the cleanup. To send written comments or obtain further information, contact the following representatives:

Mr. Ken Stachiew

U.S. Army Garrison, Aberdeen Proving Ground

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Written comments must be postmarked no later than the last day of the public comment period, which is 23 April 2001.

ATTACHMENT A

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

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Table A-1

Action-Specific ARARs

FEDERAL		
Act	**Status**	**Description**
RCRA – Hazardous Waste Management (40 CFR 260 Subtitle C)	Applicable	RCRA regulates the generation, transport, storage, treatment, and disposal of hazardous waste.
RCRA – Preparedness and Prevention (40 CFR 264.30- 31, Subpart C)	Relevant and Appropriate	This regulation outlines requirements for safety equipment and spill control.
RCRA - Contingency Plan and Emergency Procedures (40 CFR 264.50-56, Subpart D)	Relevant and Appropriate	This regulation outlines the requirements for emergency procedures to be used following explosions, fires, etc.
RCRA – Closure and Post Closure (40 CFR 264.110-120, Subpart G)	Relevant and Appropriate	This regulation details specific requirements for closure and post-closure of hazardous waste facilities.
Clean Water Act (CWA) – Surface-water quality criteria (CWA Section 303(c), 40 CFR 131)	To be considered	This regulation publishes the National Recommended Water Quality Criteria as guidance in adopting water quality standards.
Clean Water Act – Effluent limitations for point source discharge (CWA Section 402, 40 CFR 125 and 401)	Relevant and Appropriate	This regulation establishes National Pollutant Discharge Elimination System (NPDES) program requirements for discharge of treated water to a point source.
Clean Water Act – Pretreatment standards for Publicly-Owned Treatment Works (POTWs) (CWA Section 307(b), 40 CFR 403)	Relevant and Appropriate	This regulation requires new and existing industrial users to pretreat wastewater discharged to POTWs to prevent pollutants in excess of certain limits from passing through POTWs.
Clean Air Act – Emission Standards (40 CFR 61)	Relevant and Appropriate	This regulation establishes National Emission Standards for Hazardous Air Pollutants (NESHAPs) for owners or operators of sources of hazardous pollutants.
The Occupational Safety and Health Act - Protection and administer regulatory control for worker safety (29 USC 651, 29 CFR 1910, 1926)	Applicable	OSHA regulations provides guidelines for protection and regulatory control of worker safety.
Hazardous Materials Transportation Act (HMTA) – Transportation of hazardous materials (49 USC 1801-1813, 49 CFR 107, 171-177)	Applicable	HTMA establishes regulations on transportation of hazardous materials by motor carriers on highways.
MARYLAND		
COMAR* Subtitle	**Status**	**Description**
Maryland Surface Water Quality Regulations (COMAR 26.08.02)	Relevant and Appropriate	This regulation establishes Maryland Surface water Quality Criteria to protect public health or welfare, enhance the quality of water, and protect aquatic resources.
Maryland Air Quality Regulations - (COMAR 26.11.06)	Relevant and Appropriate	This regulation sets general emission standards, prohibitions, and restrictions on emissions generated from installations.
Maryland Board of Well Drillers Regulations (COMAR 26.05)	Relevant and Appropriate	This regulation sets requirements on qualifications, licenses, operator training, permitting, conduct, and safety of personnel associated with well drilling.

Table A-1

Action-Specific ARARs
(Continued)

MARYLAND (Cont.)		
COMAR* Subtitle	**Status**	**Description**
Maryland Erosion and Sediment Control Regulations (COMAR 26.08.02)	Relevant and Appropriate	This regulation holds the Maryland Water Management Administration responsible for the implementation and supervision of the erosion and sediment control program.
Maryland Annotated Code Title 2 - Ambient Air Quality	Relevant and Appropriate	The Maryland Department of Environment (MDE) adopts rules and regulations that set emission standards and ambient air quality standards.
Maryland Annotated Code Title 3 – Noise Control	Applicable	Except as otherwise provided by law, MDE adopts environmental noise standards, sound-level limits, and noise control rules and regulations as necessary to protect the public health, the general welfare, and property.
Maryland Annotated Code Title 12 – Waterworks and Waste System Operations	Relevant and Appropriate	This code establishes a certification program for superintendents, operators, and industrial operators of waterworks, wastewater works, and industrial wastewater works to protect the quality of water in which wastes are placed to protect the public health, and to prevent pollution.
Maryland Transportation of Hazardous Waste Regulations - (COMAR 11.07.01)	Applicable	This regulation establishes requirements during transportation of hazardous materials by motor carriers on highways.

*COMAR = Code of Maryland Regulations.

Table A-2

Location-Specific ARARs

FEDERAL		
Act	**Status**	**Description**
RCRA – Location of facilities in floodplains (40 CFR 264.18(b))	Applicable	This regulation states that a facility be designed, constructed, operated, and maintained to prevent washout of any hazardous waste by a 100-year flood.
Fish and Wildlife Coordination Act – Fish and wildlife conservation (16 USC 661 et seq., 40 CFR 6.302, 6(h))	Applicable	This regulation states that wildlife conservation be given equal consideration and be coordinated with other aspects of water resource development programs.
National Historic Preservation Act – Preservation of historic places (16 USC 470 e. seq., 36 CFR 65, 800)	Relevant and Appropriate	The National Historic Preservation Act declares a national policy of preserving and maintaining cultural resources.
Endangered Species Act (16 USC 1531 et seq., 33 CFR 320-330, 40 CFR 6.302, 50 CFR 27, 50 CFR 200, 50 CFR 402.01, .02)	Applicable	This regulation provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found.
Coastal Zone Management Act (CZMA) (16 USC 1451, et seq.)	Relevant and Appropriate	The Coastal Zone Management Act requires a consistency determination and state agreement prior to the issuance or expansion of activities within a state with a federally-approved Coastal Management Program when activities that would occur within, or outside, that state's coastal zone will affect land or water uses or natural resources of the state's coastal zone.
Executive Order 11988 – Floodplain management	Relevant and Appropriate	This executive order calls for avoiding long- and short-term impacts to a flood plain due to occupancy or modifications.
Executive Order 11988 – Protection of wetlands	Relevant and Appropriate	This executive order requires federal agencies to take action to avoid adversely impacting wetlands wherever possible, to minimize wetlands destruction.
Bald and Golden Eagle Protection Act (16 USC 668 et seq.) of 1940	Applicable	Establishes regulations to protect bald and golden eagles.
In the Migratory Bird Treaty Act (16 USC 703 et seq.)	Applicable	Establishes regulations to protect migratory birds.
MARYLAND		
COMAR* Subtitle	**Status**	**Description**
Maryland Tidal Wetlands Regulations (COMAR 26.24.01)	Relevant and Appropriate	This regulation sets goals to preserve the tidal wetlands of the State of Maryland, prevent their loss and plunder, and strive for a net resource gain in tidal wetland acreage and function.
The Maryland Environmental Policy Act (Chapter 703 of the Laws of 1973, as codified in Sections 1-301 through 1-305)	Relevant and Appropriate	This act mandates that state agencies, in balancing economic development and environmental quality, will engage in thoughtful consideration of the environmental effects of their proposed actions.

The Army recognizes that the State of Maryland considers the following Annotated Code Titles to be potential ARARs:

Title 2 - Ambient Air Quality Control
Title 3 - Noise Control
Title 4 - Water Management
Title 5 - Water Resources
Title 7 - Hazardous Materials and Hazardous Substances
Title 12 - Waterworks and Waste Systems Operators
Title 13 - Well Drillers

Final determination of their applicability will be made in the Record of Decision.